DOCUMENT RESUME

ED 100 777 95 SO 008 066

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TITLE Investigating Environmental Problems in a High School Biology Course for Grades 11-12.
INSTITUTION Western Washington State Coll., Bellingham. Huxley Coll. of Environmental Studies.
SPONS AGENCY National Center for Educational Research and Development (DHEW/OE), Washington, D.C.
BUREAU NO BR-0-0848
PUB DATE Dec 71
GRANT OEG-0-70-5039
NOTE 18p.; This document is part of the ongoing Sedro-Woolley Project (see ED 061 118 and 066 363); Pages 15 through 19 from the appendix have been removed to conform with copyright laws

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS *Biology; *Ecology; *Environmental Education; Environmental Research; *Interdisciplinary Approach; Models; Problem Solving; Secondary Education; Social Sciences; Social Studies; *Values
IDENTIFIERS *Sedro Woolley Project

ABSTRACT

A second-year biology class at Sedro-Woolley High School is part of an interdisciplinary program designed to develop a heightened awareness of environmental problems. A model for such a course is explained and evaluated. Students' awareness of values increases through the use of problem-solving techniques, audiovisual aids, articles and books, and school-community projects in pursuing environmental concerns. These learned values rest on sociological, psychological, emotional, spiritual, and philosophical bases that interrelate with the values of scientific and technological developments. Through this, the student becomes aware that an environmental situation is the result of the relationship of man to his world. In evaluating results of the study, two thoughts come to mind for the teacher involved in an integrated academic program: (1) in keeping with the idea that all education is environmental education, one would conclude that ideas relative to environmental concerns should be interwoven into the total fabric of the educational process; and (2) a real challenge is presented to the teacher in preparing students to recognize our society's cultural attitudes and value systems and to provide a chance for the student to become adept at evaluating these attitudes and values, his own as well as those of society, and at developing his own perceptions. (Author/JR)

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INVESTIGATING ENVIRONMENTAL PROBLEMS IN A HIGH SCHOOL BIOLOGY COURSE

for Grades 11-12

William Reinard

SP 008 066

Sedro-Woolley Project Report No. 6
December 1971
U.S.O.E. Project No. 0-0848
Grant No. OEG-0-70-5039

Huxley College of Environmental Studies
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The research reported herein was performed pursuant to a grant with the U.S. Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

TO THE TEACHER:

Presented here are ideas for multidisciplinary environmental education. The objectives of the ideas and methods suggested are clearly stated. The overall objective is to provide you, the teacher, with an aid in the development of your approach to teaching for and about the environment. These are not learning packages designed to be applied verbatim, but suggestions for ideas and methods that will enable you to develop learning packages. The contents of this report represent only the first treatment of the idea. It is published in this form in order that teachers may have an opportunity to experiment with it.

You will have to design your personal approach to environmental education. You are an environmental educator now, whether you realize it or not, because the environment is all around you and you are teaching about the environment that surrounds both you and your students. The state of the environment indicates that there is something wrong with the way in which you have learned to perceive and behave relative to the environment, and with the way you are teaching others to learn and behave in their environment today.

The ideas presented here are examples of ways in which you can incorporate environmentally beneficial learnings into your curriculum. The intent is not that you "add on" something specifically environmental to your curriculum, but that you incorporate environmental learnings into your treatments of the subject matter with which you have already been dealing. The specific manner in which you treat your responsibility to

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educate for environmental stewardship is up to you. It is hoped that these and many other ideas will help you in your effort to understand the meaning of "environmental education" and its implications for you as a teacher and as a human organism.

The environmental education development project of which this report is a part is an ongoing one, and it is hoped that all who attempt to use the report will participate in the project by reporting the results of their efforts to the project staff. The staff will compile the ideas and methods collected. This will enable all working on the development of environmental education to share each other's work and will promote the spirit of cooperation essential to the success of any project as broad as this one.

Please report the methods and results derived from your use of this report to:

John Miles, Director
Environmental Education Project
Huxley College of Environmental
Studies
Bellingham, Washington 98225

Thank you.

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INVESTIGATING ENVIRONMENTAL PROBLEMS IN A HIGH SCHOOL BIOLOGY COURSE

There is not only justification for but also a driving necessity for the study in a second year biology course of a relevant problem that relates to the interface between biology and other disciplines: the problem to which this writer refers is the environmental crisis and its ultimate resolution.

In the second-year biology classes at Sedro-Woolley High School, about ten weeks of time was devoted to an investigation of the environmental crisis. The students were juniors and seniors, and it was my concern as instructor that they develop a heightened awareness of environmental problems. There should be an investigation as a part of the student's high school learning experience to find possible avenues for ultimately resolving these problems. I decided that I would use an interdisciplinary approach to the problem because the environmental situation does involve so many of the disciplines and the related attitudes and values arising from each. These learned values rest on sociological, psychological, emotional, spiritual, and philosophical bases. One such value is the increasing emphasis upon and use of scientific and technological developments. In one believes that the environmental situation is the result of the relationship of man to his world, he must conclude that study of man in his total environment will perhaps provide the appropriate avenue on which to search for answers. Alternate life styles must be considered in order to ultimately direct or manipulate the future environment of the world.

As a result of the investigation of the environmental situation the student will achieve the following objectives:

1. He will recognize the following deeply implanted pathogenic premises as having to be replaced with values consistent and compatible with an ecological ethic.

   a. The reductionist view of man, i.e., man is nothing but a biochemical mass. The whole is explained in terms of the parts.

   b. The supposition that men are separate; that man has no responsibility to his fellow man nor for future generations.

   c. The dualistic view of man and nature; that man must fight and conquer nature, i.e., that nature is the enemy.

   d. The view of economic expansion as being the same as economic health, i.e, economic stability is unhealthy.

   e. The sacrosanct view of our nation that fosters nationalism, blind patriotism, and imperialism.

2. He will identify the following environmental imperatives that we must soon come to live with:

   a. World population cannot continue to increase. It must become stabilized to remain constant, or be reduced.

   b. We must live by the principle of frugality. Too much material cannot be taken out of the environment nor can too much be put back.

   c. We must learn to experience nature as an extension of ourselves, ourselves as extensions of nature.

   d. We must achieve a steady-state economy. We cannot hope to perpetuate a continuing increase in the Gross National Product.

   e. We must prepare ourselves to be cooperative-nonaggressive personalities, not competitive-aggressive personalities.

3. He will debate the pros and cons of objectives 1 and 2 in discussion groups.

4. He will examine man as a product of his environment through evolutionary (genetic and environmental) processes acting through the last 1-2 million years.

5. He will identify the idea that man's environment has been changing at an increasingly rapid rate.

6. He will explore the hypotheses expressed by different authors relative to the nature of man.

7. He will relate these hypotheses to the environmental situation.

8. He will learn to perceive himself as one who is a contributor to the environmental problem and he will, in analyzing the solution, become a contributor in working actively toward ultimately resolving the situation.

As a preliminary motivation to the study of the environmental concerns, an environmental news bulletin board section was maintained in the classroom. At the beginning of the program the students in second year biology were provided with the duplicated sheet "Search for Answers about Man and His Environment" (see Appendix). Then, (1) topics for investigation were selected by class members and prepared for presentation to sixth grade classes; (2) articles were selected for the class to read and discuss; (3) books were read and presentations made; and (4) papers were prepared with the expression of the individual student's perception of himself (and man) as he and the world interrelate.

In identifying the extent to which the environmental crisis exists and in pursuing the investigations in such a manner that would ultimately induce involvement of the student in working toward a solution, members of the class selected topics for investigation. They prepared themselves to make presentations to a few sixth-grade classes within the district (a few blocks away). Informing others proved to be a big motivational factor. The students' topic "investigations" were also presented in our class.

A variety of audio and visual aids were employed. A student with

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photography talents was provided with film, and then made slides from pictures selected by students. The pictures were taken on the second day of the information gathering and with speedy processing the pictures were ready to use in the presentations. Cassettes were used to record music with a "message" as part of a sound slide presentation. One boy prepared a nearly professional presentation incorporating slides and music into his program. His program has been presented to a women's sorority group and also to a church group in the community.

Investigation topics for the presentation to the sixth graders included oil spills, mercury pollution, Great Lakes pollution, garbage and sewage, recreation, animal extinction, swans, noise pollution, U.S. poverty, a change of values, atomic industry waste, automobile pollution, air pollution, SST, resource depletion, population, dams and electric power, birth control, balance in nature, insecticides (DDT), industrial wastes, wildlife management, North Slope oil operation, ocean pollution, and National Parks.

Among articles that were selected for the class to read was one written by Sir Charles Darwin, entitled "Forecasting the Future."* Fred Hoyle, in his own essay, "Forecasting the Future?"** responds to Darwin's article. Another essay, "Unorganized Humanity is Crowding Us Off the Earth," by Robert O. Lee was given to the students (a copy of this article in included in the Appendix). The author discusses resource depletion

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*Charles Darwin, "Forecasting the Future," Engineering and Science, April 1956, pp. 22-36. (Also in Biological Science: Interaction of Experiments and Ideas, Biological Sciences Curriculum Study, Prentice-Hall Inc., Englewood Cliffs, N.J., 1965, pp. 333-345.

**Fred Hoyle, "Forecasting the Future?" Engineering and Science, June 1956, pp. 8-10. (Also in BSCS, pp. 345-348.)

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and types of pollution and proposes solutions involving world councils dealing with needs of man and environment. In the article, he quotes Arnold Toynbee's question, "What is the true end of man? Is it to populate the earth with the maximum number of human beings--or is it to enable human beings to lead the best kind of life that the spiritual limitations of human nature allows?" The class, upon reading the articles, evaluated them in discussion. They expressed both agreement and disagreement with all three authors.

The third phase of the investigations involved the selection of paperback books to read. Following is a list of the books used.

Books that relate to man as a biological creature and a product of evolution:

Man: His First Million Years, Ashley Montagu

The Naked Ape, Desmond Morris

African Genesis, Robert Ardrey

Books that allude to the practice of rampant disregard for the natural environment:

America the Raped, Gene Marine

Moment in the Sun, Robert and Leona Rienow

Silent Spring, Rachel Carson

The Frail Ocean, Wesley Marx

The Web of Life and Man in the Web of Life, John Storer

Books that speculate about possible futures:

Brave New World and Brave New World Revisited, Aldous Huxley

1984, George Orwell

Books that propose solutions for mankind's dilemma:

Population Bomb and How to Be a Survivor, Paul Ehrlich

Operating Manual for Spaceship Earth, Buckminster Fuller

A book that includes the basics of ecology and presents a beautiful perception of a land ethic:

A Sand County Almanac, Aldo Leopold

A book that investigates behavioral aspects of animals which may have application in better understanding of human activity:

The Territorial Imperative, Robert Ardrey

Books that relate to the environment in various ways:

The Environmental Handbook, Garrett DeBell, Ed.

Ecotactics: The Sierra Club Handbook for Environmental Activists, John Mitchell and Constance Stallings

The Edge of the Sea and Under the Sea Wind, Rachel Carson

Two other books applicable to such a program but not used are The Greening of America by Charles Reich and On Aggression by Konrad Lorentz.

As students progressed in their reading, those reading the same book or books by the same author met in small groups to organize their presentation to the class. Included in the presentations were: elaborations on highlights of the book, the author's attitudes and beliefs, and the readers' reactions to the book. Interaction then followed in the discussion. With some presentations there seemed to be great response and class interaction; in others the interaction was minimal. For these discussions a circular seating arrangement seems to contribute to class cohesiveness not achieved with a traditional seating pattern. Much more

eye contact and visual communication among the members of the class is possible. It is important that an atmosphere exist where the student has the impression that what he has to say will be respected. One way to do this is to permit pauses of silence and keep instructor comments to a minimum. Discussion often develops and flourishes in these situations. Upon the completion of the book presentations and discussions, students prepared papers in response to the duplicated sheet, "Search for Answers About Man and His Environment."

A result of the study of various aspects of the environmental crisis was student presentations to community groups. Three boys presented a program involving the books How to Be a Survivor and Operating Manual for Spaceship Earth, along with a slide and music segment, that was very well accepted by the Skagit Environmental Council. Later the two boys who discussed the books made their presentations to the Kiwanis Club of Mount Vernon, but did not experience the same degree of acceptance of ideas.

In subjectively evaluating the results of this study, this writer concludes that the oral presentations were generally of a very good quality. A very large segment of the students completed the study with expression of very favorable attitudes toward our investigation. About 10 per cent of the students, all from the first two of three classes to complete the investigation, did not appear to fully appreciate the importance of our environmental crisis. It is the belief of this writer that many of these students had expected something different from a biology class.

Two thoughts come to mind: (1) in keeping with the idea that all education is environmental education one would conclude that ideas relative to environmental concerns should be interwover into the total fabric of the educational process, and (2) a real challenge is presented to the teacher in preparing the students to recognize our society's cultural attitudes and value systems and to provide a chance for the student to become adept at evaluating these attitudes and values, his own as well as that of society, and to develop his own perceptions.

From this point one must continue investigating the implications of values and attitudes and work toward a progressive change of our society's value systems. A study of the ideas of many authors about the philosophical questions relative to humanity will probably provide many of the answers for achieving a world of peace and harmony--a harmony among men and nations, and also harmony with nature.

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APPENDIX

Handout sheet, "Search for Answers about Man and His Environment"

"Unorganized Humanity is Crowding Us Off the Earth," article by Robert O. Lee from NORTHWEST TODAY

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UNORGANIZED HUMANITY IS CROWDING US OFF THE EARTH

by Robert O. Lee

Pages 15 through 19 were removed form this document prior to its being submitted to the ERIC document reporoduction service.

*From Seattle Post-Intelligencer NORTHWEST TODAY, Sunday, March 23, 1969. (Robert O. Lee is a vice-president of the Georgia-Pacific Corporation. A Seattle native, Mr. Lee has been active in Northwest recreational activities.)

SEARCH FOR ANSWERS ABOUT
MAN AND HIS ENVIRONMENT

At the conclusion of the units of book reading, article readings, individual environment topic investigations, and some of the projects, each class member will be asked to compose statements of beliefs or understandings relative to the following questions:

1. Where has man been? Where is man now? Where is man going?

2. Who am I? What am I? What is my destiny?

FORMAT FOR BOOK READING

1. Read the selection of your choice, from the classroom supply of books or from another source, but which pertains to mankind and the environment.

2. Meet with other class members who are reading the same book to generally discuss the attitudes, ideals, beliefs and facts expressed by the author.

3. A brief synopsis of major ideas of the author as discussed by your group along with your names will be duplicated for distribution to other class members.

4. Prepare an oral panel or other type of presentation to be made to the class. Include a discussion of ideals, attitudes, and beliefs of the author as well as pertinent factual materials. At this time class members may ask questions for further understanding of the author's views and may express their own views.